beneficial, through other grades to wholly destructive and useless species.

Coming now to the results, it is shown that insects were found in 41 per cent. of the total *post-mortem* records and pellets, while if certain birds—*e.g.* finches, owls, hawks, and water birds—are omitted "the insects forming the whole or part of the dietary of the remaining birds amount to between 70 and 75 per cent."

Large numbers of injurious insects were taken by all kinds of birds, click beetles and their larvæ (wireworms), weevils, crane flies and their larvæ (leather jackets), surface caterpillars and winter moth caterpillars being numerous; for example, five specimens of the rook contained between them 213 surface caterpillars, and 120 winter moth larvæ were found in a jay's stomach.

Grain occurred in about 77 cases, but in almost negligible quantities, and, except in the case of the blackbird and of fruit buds damaged by the bullfinch and blue titmouse, cultivated fruit was scarcely represented. Noxious weed seeds were taken by many birds.

Of the birds themselves, the majority come under the "useful" class; the song thrush, great and blue tits, greenfinch, chaffinch *and rook* have the balance of utility in their favour; the blackbird, bullfinch, sparrow-hawk and raven are destructive and doubtfully of any utility; while it is noteworthy that those species regarded as "wholly destructive and useless" number but three—the carrion crow, house sparrow and wood pigeon, the food of the two latter, however, not being considered.

Mr. Newstead's paper should be widely read, for it may certainly be held as a vindication of the bird world, and it is easy to understand the author's emphasis of the great value of the majority of birds. As hinted in the official preface, it is to be hoped that further reports will be forthcoming at a later date.

NOTES.

THE most disastrous earthquake in Europe for many years was experienced in Calabria and the district of Messina, in Sicily, on Monday, December 28. The shock occurred at 5.20 a.m., and was followed by a great sea-wave, which appears to have destroyed Messina and Reggio, and also the greater part of the villages on each side of the Straits of Messina. Reports from Catanzaro state that the first intimation of the disturbance was a prolonged, thunderous noise followed by a vivid flash of lightning, and at the same time by a series of violent shocks which seemed interminable. Heavy torrential rain then fell, and continued to fall during Tuesday. According to reports from *Times* correspondents, so complete has been the destruction of Messina that it is almost impossible to obtain any connected account of the character of the earthquake. The centre of the disturbance seems to have been in the Straits, and it is greatly feared that the whole conformation of the neighbouring coast-line has been changed. On Tuesday, the officer of a torpedo-boat who left Messina for Reggio sent after a few hours the following message:—"I cannot find Reggio; if it exists, it is no longer where it was." The lighthouses in the Straits have been rendered useless by the earthquake, and it is rumoured that the configuration of the bottom of the Straits has been altered greatly. It is estimated that the number of deaths will reach the terrible total of 100,000, for in Messina alone 50,000 lives are said to have been lost. It will be recalled that the province of Calabria was visited with like disasters in September, 1905, and October, 1907.

A TOUCH of real winter has set in over Great Britain since Christmas, and the closing days of December will be remembered for the heavy falls of snow and the severe frosts which have occurred. At Christmas a cold but dry easterly wind was blowing over the whole country, but on December 27 a shallow disturbance traversed the northern portion of the kingdom, and a fall of snow was generally experienced. The heaviest fall occurred in Scotland, but the amounts were fairly large over England, the fall being generally augmented on the following days, and much inconvenience was occasioned on our railways and to other traffic. The frost was exceptionally keen in all parts of Great Britain, and unusually low temperatures occurred in many places. The lowest thermometer readings were mostly experienced on the night of December 28 and on the following day. At Oxford the thermometer on the grass registered 14°, and at Greenwich a similar thermometer read 17° on the early morning of December 29. Much snow has fallen in London and the suburbs, and in St. James's Park, the observing station of the Meteorological Office, the sheltered thermometer stood at 22° at mid-day on December 29. The Greenwich records for the past sixty-eight years only show three instances of the highest day temperature below 25° in December; these occurred in 1855, 1874, and 1890, the lowest previous record being 23°·2, in 1855. Intense cold has occurred generally over western Europe, the minimum thermometer in the screen registering 3° at Berlin and 5° at Brussels on the night of December 28. This severe weather was accompanied by high easterly winds in many places.

WE learn with deep regret of the death of Dr. J. M. Pernter, director of the Zentralanstalt für Meteorologie und Geodynamik in Vienna, and professor of terrestrial physics in the university there. Dr. Pernter died on December 20 at Arco, in South Tyrol, at sixty years of age.

THE Weekly Weather Report just issued by the Meteorological Office gives a summary of the observations for the past year. The highest shade temperatures for the several districts range from 91° in the west of Scotland to 81° in the north of Scotland and in the north of Ireland. The lowest temperatures range from 10° in the east of Scotland and in the Midland counties to 19° in the north of Scotland and 24° in the English Channel. The mean temperature was not generally very different from the average, but there was mostly a slight excess. The number of rainy days ranged from 252 in the north of Scotland to 167 in the south-east of England, and they were mostly in fair agreement with the normal. The largest aggregate rainfall for the year was 51·14 inches, in the north of Scotland, which is 1·17 inches less than the average; the next largest measurement was 46·85 inches, in the west of Scotland. The largest total in the English districts was 36·36 inches, in the north-west, and the least 20·14 inches, in the north-east. The rainfall was nearly everywhere in defect of the average; in the south-west of England the deficiency was 6·93 inches. The duration of bright sunshine varied considerably in different parts of the kingdom, the largest amount being 1897 hours, in the English Channel district. In the south-east of England there was the greatest excess, the total duration being 1737 hours, which is 140 hours more than usual.

WE regret to see the announcement of the death of Dr. George Gore, F.R.S., at eighty-two years of age.

ACCORDING to a Reuter message, the newspapers of Burgos report that five meteoritic stones, weighing from

one to seven kilograms, fell a few days ago in the village of Jubilla del Agua, setting fire to a farm.

DR. HAROLD R. D. SPITTA, assistant lecturer on bacteriology and lecturer on clinical pathology at St. George's Hospital, has been appointed to the newly created post of bacteriologist to the Royal Household.

ACCORDING to the *Scientific American*, the U.S. War Department has considered the advisability of immunising soldiers against typhoid fever by vaccination. It has decided that inoculation as a preventive against typhoid has been demonstrated so thoroughly, and its efficacy so well established, that the vaccination method is to be adopted in the United States Army.

WE learn from *Science* that an investigation into the cause of cancer, and its possible prevention and cure, has been begun in the College of Physicians and Surgeons, Columbia University, under the direction of a committee consisting of Dr. S. W. Lambert, dean; Prof. W. J. Gies, professor of biological chemistry; Prof. P. H. Hiss, jun., professor of bacteriology; Prof. F. C. Wood, professor of clinical pathology; Prof. G. N. Calkins, professor of protozoology; and Dr. Eugene H. Pool, instructor in the department of surgery.

THE American National Association of Audubon Societies is organising a complete census of the game and forest birds of the country. This work will be superintended by a committee consisting of Mr. W. Dutcher, president of the association; Mr. E. H. Forbush, ornithologist of the Massachusetts State Board; Mr. T. Gilbert Pearson; Mr. Frank M. Chapman, assistant curator at the American Museum of Natural History; and Dr. T. S. Palmer, of the U.S. Biological Survey. Thousands of question forms are to be sent to friends of the association throughout America, as well as to all wardens and officials who have opportunities of observing the bird life of their own neighbourhoods. The object of the census is to collect cogent evidence of the need of greater protection for the nation's birds, especially in the interests of the crops and the trees.

THE following are among the prizes awarded by the Paris Academy of Medicine for 1908, announced in the *British Medical Journal*:—the Laborde prize (200*l*.), for the most notable advancement of surgery, to Prof. Monprofit, of Angers, for his work on the operative surgery of the stomach; the Theodore Herpin prize (120*l*.) to Dr. Albert Deschamps, of Riom, for an essay on the diseases of energy—general asthenias; the Amussat prize (40*l*.) to Dr. Destot, of Lyons, for a radiographic and clinical study of the wrist and industrial accidents; the Orfila prize (160*l*.) to Prof. Calmette, MM. Boullanger, E. Rolants, F. Constant and L. Massol, and Prof. Buisine, for researches on the purification of water that has been used in towns and of the residual water of factories. The Roger prize (100*l*.) to Dr. Marfan, for his treatise on the feeding of infants; the Saintour prize (176*l*.) to Dr. Émile Sergent, for his work on syphilis and tuberculosis; the Campbell-Dupierris prize (92*l*.) to Dr. Morris Nicloux, for his work on general anæsthetics from the chemico-physiological point of view; the Ernest Godard prize (40*l*.) to Dr. F. W. Pavy, of London, for his work on carbohydrates and their transformation—a physiologico-pathological study with considerations on diabetes and its treatment.

WE regret to announce the death of M. E. Stuyvaert, who for many years occupied a prominent position in the Royal Observatory of Belgium. For nearly thirty years he rendered loyal and efficient service to that institution, both at Brussels and in its more recent installation at Uccle. He was one of the Belgian astronomers who took part in the observation of the transit of Venus in 1882, and from that time onward he took the greatest interest in extra-meridional work. He was in charge of one of the equatorials, and was indefatigable in his observation of comets and planets, as well as of eclipses and occultations. The physical appearance of the larger planets was a subject which engaged his attention, and he published several memoirs on the surface markings of Jupiter and Mars. His micrometrical measures of double stars from 1878–96 is a well-known work. In addition to instrumental observation, he paid considerable attention to the subject of meteors and the appearance of the zodiacal light. For some time previous to his death he had been engaged in constructing a large-scale model of the moon, which, unfortunately, is left unfinished.

MR. H. ST. JOHN GRAY contributes to the *Times* of December 26 a full account of excavations in the Maumbury Rings Circle, of which he was in charge. This has long been regarded as the site of a Roman amphitheatre, and this view is corroborated by the fact that one of the most interesting discoveries made was that of a stratum of shell fragments, quartz, flint, land-shells, &c., similar to that used by the Romans in other places to fill up uneven patches, to prevent the slipping of the gladiators, and to absorb the blood of combatants. Fragments of pottery also indicate Roman occupation, and one portion of the site seems to have been fortified, holes for stakes cut in slabs of Purbeck limestone having been found at the point where the entrance of the arena was situated. It is interesting to find that this place was occupied by the Neolithic people as a flint workshop. Flint flakes, cores, and hammer-stones were found scattered on part of the site, and the picks made of deer's antlers were obviously the implements by which this early race excavated the remarkable pit whence the rough flints were obtained. This pit is at least 30 feet deep, one of the deepest archæological excavations on record, one of those at Grime's Grave being a few feet deeper. It is much to be desired that a site which seems to have been almost continuously occupied since Neolithic times by various peoples should be fully investigated, and it may be hoped that the appeal for help issued by Mr. Gray from Taunton Castle, Somerset, may meet with a liberal response.

A SHORT time ago Dr. O. P. Hay's memoir on the fossil chelonians of North America was reviewed in our columns. The author has supplemented this in No. 1640 of the Proceedings of the U.S. National Museum with an account of four new species, together with a note on a fifth named by Cope.

TO No. 5 of vol. viii. of the *Museums Journal* Dr. A. Fairbank, the director, contributes an account, illustrated with plans, of the new building for the Museum of Fine Arts in Boston, U.S.A., which, it is hoped, will be completed early in the new year. Great care appears to have been exercised in the planning of the building, which, it is stated, will be admirably adapted for the display of the treasures with which it is to be filled.

SOME time ago Dr. E. Fraas published an account of bones of sauropod dinosaurs obtained by himself in German East Africa. The remains were found lying on the surface of the ground in considerable numbers, and only a portion of those seen appears to have been brought home. With the view of securing additional specimens, Dr. Fraas

we are given to understand, is about to make another expedition to East Africa.

A BEAUTIFULLY coloured plate, in addition to several others in black and white, illustrates a further report, by Mr. R. W. Sharpe, on the ostracods in the United States National Museum, published as No. 1651 of the Proceedings of the Museum. No. 1654 of the same publication is devoted to amphipods collected off the west coast of North America, which include a new family, together with several new genera and species. Mr S. J. Holmes is the author of this communication.

A FURTHER account of fishes of the Irish Atlantic slope forms the subject of Irish Fisheries, Scientific Investigations, 1906, part v. (1908). The authors, Messrs. Holt and Byrne, commence in this issue an illustrated account of the more uncommon deep-water fishes of the Atlantic coast, with the object of rendering the species easily identifiable by fishermen, and commence with the families Scorpænidæ and Alepocephalidæ, of which a number of representatives are figured. This is followed by an account of recent additions to the marine fish-fauna of the British Isles, these including a new species of ray.

THE greater portion of vol. xii., part ii., of the Transactions of the Leicester Literary and Philosophical Society is devoted to an illustrated account, by Mr. A. B. Harwood, of the town museum, of the fossil flora of the Leicestershire and South Derbyshire Coalfield, with especial reference to the evidence it affords with regard to the age of the local Coal-measures. It is concluded that the Coal-measures of the Ashby, or central, district are lower in the series than those of the eastern and western districts, which belong mainly or wholly to the middle portion of the series.

THE opening article in the November issue (vol. ii., No. 8) of the *Anatomical Record* is devoted to the methods of teaching anatomy in the medical schools of the United States, more especially at Johns Hopkins University. The importance of concentrating elementary teaching is strongly insisted upon by the author of the paper, Mr. F. P. Mall, this, as applied to anatomy, meaning that the elementary work should be given during the student's first year, the schedule being so arranged that the greater part of the time of each pupil is devoted to this subject until the elementary portion is completed. "It has been the aim of American anatomists," concludes the author, "to elevate the status of our profession, for it has been resting as a compressed buffer between surgery on the one hand and zoology on the other."

REGENERATION at the two extremities of the body in the annelid *Spirographis spallanzanii* forms the subject of the first article, by Mr. P. Ivanov, in vol. xci., part iv., of the *Zeitschrift für wissenschaftliche Zoologie*. It is stated that in this and allied polychætous annelids, living a sedentary life in tubes constructed by themselves, the phenomenon of regeneration presents a special interest on account of the fact that the bodily structure of these creatures shows several peculiarities, such, for instance, as the abnormally large size of the nephridia in the anterior segments. The regenerated extremities are described in detail in the text, and fully illustrated, both from the external aspect and by means of sections, in the plates.

LIKE many other British birds, the scaup-duck seems to be extending its breeding-range in our islands. According to an account relating to Scotland, given by Mr. P. H. Bahr in the December number of Witherby's *British Birds*, the species was recorded as breeding near Loch Hope in 1834; in 1867 a clutch of ducks' eggs, believed to be those of a scaup, were taken, while in the following year a drake was shot in Sutherland in circumstances suggesting that it was breeding. The first definitely authenticated nest and eggs were obtained in Speyside in 1899, and in 1897, 1898, 1899, and 1900, as well as probably in the two following years, the species bred in the islands south of the Sound of Harris. In 1906 two other nests were discovered in these islands, one of which is figured in Mr. Bahr's paper.

AMONG a number of articles in vol. xxx., No. 1, of Notes from the Leyden Museum, we select for mention one by Mr. E. Jacobson on the construction of the nests of the Javanese ant *Polyrhachis bicolor*. In common with a few other species, these ants spin nests in the leaves of palms and other trees. The example described and figured takes the form of a long and slender tube, slightly expanded at the two extremities, and with a minute entrance at the lower end, its total length being 25 cm. It was constructed in a palm-leaf, and when examined was found to contain one winged female, twenty-five males, twenty-four workers, and a number of pupæ and larvæ in various stages of development. The note concludes with a description of a somewhat more complicated spun nest constructed by the West African *Polyrhachis laboriosa*.

THE embryology and anatomy of hyperdactylism in Houdan domesticated fowls is discussed in great detail by Marie Kaufmann-Wolff in vol. xxxviii., part iv., of *Gegenbaur's Morphologisches Jahrbuch*. The abnormality usually takes the form of an extra digit on the inner side of the hallux or great toe, but in some instances assumes a more complicated type. In the plates and text-figures the structure of the foot is displayed by means of sciographs, dissections, and embryo specimens. Embryology decisively shows that the additional digit or digits arises as a bud from the metatarsal or phalangeals of the hallux, which, in the course of its development, becomes segmented, and eventually appears as a duplication or triplication of the latter. The hyperphalangism is therefore essentially a neomorphic, and in no wise an atavistic, condition, its evidence thus being altogether opposed to the theory of the existence in vertebrates of a prepollex or prehallux.

No. 27 of the "North American Fauna" (U.S. Department of Agriculture) is devoted to an account of the natural history of the Athabasca-Mackenzie region, by Mr. E. H. Preble, based on a recent biological survey of that area. The region is of considerable importance from a commercial point of view on account of the number of valuable fur-bearing animals by which it is inhabited, while it is of special interest to the naturalist as being the one in which the last remnants of the American bison survive in a truly wild state, and it is also the home of the Canadian race of the musk-ox. In the spring, when its springs and rivers are released from the icy grip of the long Arctic winter, the region is likewise the resort of countless flocks of birds of various kinds which breed within its limits, these including representatives, and in some cases the great majority, of most of the migratory game-birds of North America. The monograph, which comprises 564 pages, deals chiefly with the vertebrates, although it likewise contains a section on the trees and shrubs of the district. The explorers were unable to obtain any definite information with regard to the present numbers of the bison, but the herds are stated to be much

harassed by wolves, and the opinion is expressed that unless something is speedily done to reduce the number of the latter, the bison is doomed ere long to complete extermination. Two parties, comprising respectively eight and sixteen head, were reported by the Indians to include no yearlings or two-year-olds, all the calves having been killed by wolves.

IN the December number of *Man* Mr. A. Lang returns to the well-worn controversy on the subject of totemism by a criticism of Dr. Seligmann's paper in the previous number on the subject of "linked totems." He rightly questions the admissibility of the term, and remarks on the confusion between the words "tribe" and "clan" in dealing with the subject. It seems clear that until a recognised terminology comes to be adopted by all writers, the origin and meaning of totemism must remain to a large degree uncertain, and the important problems of its relation to exogamous marriage and prohibited forms of food will continue to be incapable of solution. It may be hoped that in his great forthcoming work on totemism Prof. J. G. Frazer will finally settle the nomenclature of the subject, and thus dispose of difficulties which have led to much wearisome and embittered controversy.

MR. W. K. MOORHEAD, of the Phillips Academy, Andover, Massachusetts, which claims to be "the only preparatory school in the world that possesses a fine museum and department of archæology," has issued two fresh Bulletins, Nos. 3 and 4. The second and more important contains an elaborate monograph on the famous site of Fort Ancient, the great prehistoric earthwork of Warren County, Ohio. It is satisfactory to learn that the State Legislature has now completed the purchase of this important site, which will be preserved as a public park. Needless to say, the age of this monument and its relation to the immense aboriginal cemetery at Madisonville have long formed a subject of controversy among American anthropologists. Mr. Moorhead, who has done much work on the spot, thinks that Fort Ancient may be some eight or nine centuries old, and he dismisses the modern articles found in a grave at Madisonville as "intrusive." It is clear, however, that this *résumé* of the facts at present available will not close the discussion. The writer admits that "we have but begun the right study of the Ohio Mounds," and that it will take many years to complete the field work which is necessary before the problem of their origin and age can be finally solved.

ALTHOUGH the rules and recommendations regarding botanical nomenclature at the Vienna Congress were framed primarily for the guidance of systematic botanists, it is important that they should be generally known. A pamphlet, reprinted from the Transactions of the New Zealand Institute (vol. xl.), gives the substance of an address on the subject read by Mr. T. F. Cheeseman at the Auckland Institute. It provides a good epitome of the salient points, and contains a list of changes caused in the nomenclature of New Zealand ferns. A second contribution to the fuller knowledge of the flora of New Zealand, by the same authority, is concerned mainly with the record of new localities.

INTENDING visitors to Connemara in search of botanical rarities will find it profitable to consult the account of an excursion published in the Transactions and Proceedings of the Botanical Society of Edinburgh (vol. xxiii., part iii.). The two plants, *Erica Stuarti* and *Erica Mackaiana*, that formed the immediate object of the expedition, were obtained. In the same part Mr. W. W. Smith describes a remarkable tussock formation observed in the Scilly Isles, where plants of *Arundo phragmites*, *Pteris aquilina*, and *Carex paniculata* were growing together in clumps, rising as high as 8 feet above the marshy substratum. A short note on the collection of five species of Riccia in the Edinburgh district is contributed by Mr. W. Evans.

AMONG the systematic articles published in the latest part (No. 9) of the *Kew Bulletin*, special interest attaches to the description of a new species of the Burmanniaceæ, *Bagnisia Hillii*, reported from New Zealand by Mr. T. F. Cheeseman. Species of the subfamily to which Bagnisia belongs have been hitherto collected in Ceylon, Samoa, and New Guinea, so that the discovery in New Zealand extends the range considerably further south. Another contribution of considerable interest, more especially to the small cultivator, is the account of a Lancashire willow farm furnished by Mr. W. Dallimore. The willows are grown on dry land under similar conditions to ordinary farm crops; the best twigs are obtained from special varieties of the species *purpurea*, *viminalis*, *rubra*, and *Smithiana*.

WE are in receipt of the recent issues of the *Agricultural News*, a fortnightly paper issued by the West Indian Department of Agriculture dealing with matters of interest to tropical agriculturists. The subject-matter consists mainly of excerpts from various agricultural journals and bulletins, the selection being carefully and intelligently made. Altogether the paper must be ranked among the most useful of our agricultural publications.

THE determination of total solids in sugar-mill products has usually been rather a tedious and uncertain business by reason of the instability of certain compounds in the molasses. Mr. Peck finds that the Abbe refractometer can be used conveniently, and describes the method of working in Bulletin No. 27 of the Hawaiian Sugar-planters' Association. He gives also a set of tables to show the percentage of total solids corresponding with each refractive index. The agreement between the results obtained in this way, and by the older method of drying, is satisfactory, and the method promises to be very useful to sugar chemists.

WE have received from the Board of Agriculture leaflets dealing with gooseberry black-knot (*Plowrightia ribesia*, Sacc.), grain weevils (*Calandra granaria* and *C. oryzae*), and the apple saw-fly (*Hoplocampa* [*Tenthredo*] *testudinea*). They give illustrations showing the pest in its various stages, and the kind of damage it does; there is also a description, in simple language, which will help the practical man in his identification. Schemes of treatment are suggested.

INCREASING attention is being devoted in South Australia to fruit production and to the best methods of placing the products on the market. The *Journal of Agriculture of South Australia* has recently described at some length how fruit-drying is practised in California, where this practice has been developed to a high degree of perfection. The fresh fruit is first fumigated by means of sulphur, then spread on trays and exposed to the sun until dry; but as the weather conditions may become unfavourable, the larger drying grounds are also provided with elaborate drying plant, so arranged that the fruit shall be exposed to a gradually increasing temperature. The tray of fruit is placed in a gently sloping tunnel up which a stream of hot air from a furnace passes, and is gradually pushed downwards as fresh trays are put on behind. This slow

drying is found to give much better results, and to yield a finer product, than more rapid drying would do.

HYDROCYANIC acid is fast becoming a recognised agent for the destruction of various insect pests that infest greenhouses, trees, &c., although the conditions for success are not yet fully known. It is used in combating citrus scales in South Africa, New South Wales, Florida, and elsewhere, with results which, on the whole, are very satisfactory. The fumigation of trees growing in the open air is made possible by covering the tree with a tent. Dr. Morrill recently described in Bulletin No. 76, Bureau of Entomology, U.S. Department of Agriculture, an ingenious graduated tent that not only covers the tree, but also indicates the volume enclosed, thus enabling the operator to use a definite quantity of hydrocyanic acid for each cubic foot of air. The tent is shown in the illustration; it is a large sheet with numbers painted on it in two directions at right angles, starting from the middle. A table has been drawn up showing the proper amount of potassium cyanide to use when any particular numbers mark the base of the tent. The method marks

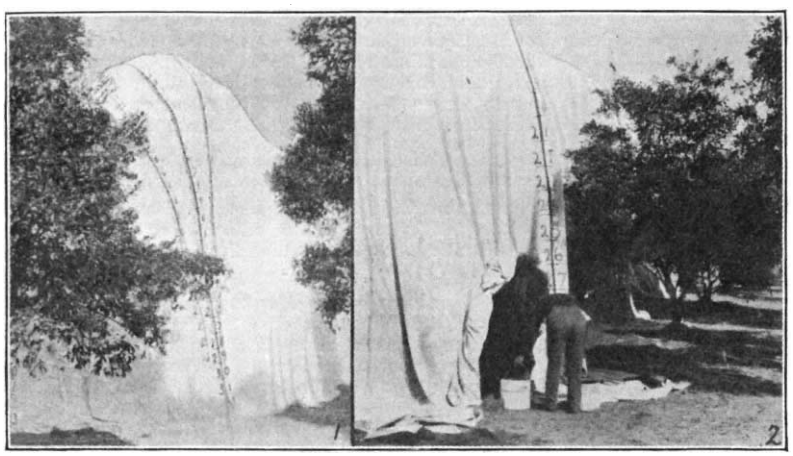

FIG. 1.—Eighty-foot tent covering large seedling orange tree, showing tent graduated for the purpose of enabling operators to use the proper amount of potassium cyanide.
FIG. 2.—Carrying 5-gallon crocks containing acid and water under the tent, preparatory to introducing the cyanide.

a distinct advance in outdoor fumigation by enabling the operator to avoid an excess of hydrocyanic acid, which would injure the tree, whilst ensuring a sufficiency to kill the pest.

THE *Philippine Journal of Science* for September (iii., No. 4) contains several papers of medical interest. Mr. Old reports several cases with unusually severe symptoms caused by stings of an unknown variety of jelly-fish, and Mr. Ruediger describes filtration experiments with the virus of cattle plague which show that the virus is small enough to pass through the pores of the Berkefeld filters V, N, or W, but not through a Chamberland B filter.

IN a second report on research work issued by the Metropolitan Water Board, Dr. Houston, the director of water examinations, details the methods employed and the results obtained in experiments planned with a view to the detection of the typhoid bacillus in *raw* Thames, Lee, and New River waters. The result is that the typhoid bacillus was not once detected. Dr. Houston says, "the most recent tests for *B. typhosus*, applied to a considerable volume of raw river water, at weekly intervals, during a period of twelve months, and involving the study of 7329 samples, failed to reveal the presence of a single typhoid bacillus. It would, however, be altogether presumptuous to infer from these observations that the typhoid bacillus is never present in the raw river waters, or to conclude that any relaxation in the processes of purifying the raw river waters, by storage and filtration, before delivery to consumer, is justifiable."

WE have received No. 1 of the weekly report of the seismological stations established by Messrs. Nobel at Baku and Balakhany, the instruments in each station being a pair of Zöllner light horizontal pendula with photographic registration. We may take this as an indication of the growing interest in the study of earthquakes and of the recognition of its economic applicability by a firm which has always been remarkable for enlightenment and progressiveness.

IN the *U.S. Monthly Weather Review* for August last Prof. C. Abbe, in a note entitled "The Duty of the Government to Protect the People from Swindlers," says, with reference to rain-making and other experiments:—"It is the duty of the editor to call attention to the fact that the folly of any human attempt to make rain or to alter the weather in any way has been so abundantly demonstrated in this country, in Europe, in Australia, in New Zealand, and elsewhere, that it is high time our law givers made it a penal offence to do this or to secure money under such false pretences as these promises are." No special mention is made of the dispersion of fog; would Prof. Abbe include this under altering the weather in any way?

THE current number of the Journal of the Scottish Meteorological Society (vol. xiv., No. 25) contains an important discussion of the climate of Orkney, by Mr. M. Spence. From 1827 to 1885 observations were made at Sandwick by the Rev. Dr. Clouston; since that time they have been continued first by Dr. Fortescue at Swanbister, and afterwards by Mr. Spence at Deerness. Dividing the mean temperatures into two periods of forty years, the first, 1827–66, gives 46°·1; the second, 1867–1906, gives 45°·6; difference, 0°·5. A comparatively small range is natural, from the insular position; the lowest mean for any month is 31°·3 (February, 1838), and the highest 61°·4 (July, 1852); the mean difference between day and night temperature is very small. The mean annual rainfall (1841–1907) was 36·7 inches; the driest month is May, the wettest October. The Orkneys surpass any other district in Great Britain in the number of gales, the yearly average being about ninety-seven. Winds from S. and S.E. are much more frequent than from S.W. and W. Mr. Spence remarks that the Orkney statistics "entirely dispose of the belief that is almost universal, at least in these islands, that there are equinoctial gales." Excepting that it avoids extremes, the climate as a whole does not vary greatly from that of the north of Scotland.

FROM a reprint that we have recently received of Prof. L. Palazzo's presidential address to the International Seismological Association at its meeting at the Hague in September, 1907, we observe that he attributes more par-

ticularly the great interest now generally taken in seismological studies to the hope that these may aid in solving the problems inherent to the constitution of the interior of the globe. In the course of his remarks he said that the great improvement in self-recording instruments has enabled us to determine the trajectories of the seismic waves, to study their reflection, refraction, dispersion, and absorption; but he remarks that we shall never be able to avoid the terrible scourge of the earthquake, nor even to foretell it. Modern discoveries, however, have led us to consider the interior of the globe to be formed of a solid nucleus, with a density and rigidity greater than that of steel. This nucleus is enveloped by a rocky crust, but between this crust and the metallic nucleus lies, at a great depth, the layer of plastic matter, of high temperature, which explains volcanic phenomena and their localisation.

WE have received from the Royal Observatory of Belgium the results of recent balloon ascents made at Uccle, including those arranged for by the International Commission for Scientific Aëronautics, from July 27 to August 1. The observatory was very unfortunate during this period; the records of two ascents were wilfully destroyed, and only one ascent, that of July 30, reached a considerable altitude, 15·2 kilometres, where the temperature by M. Hergesell's metallic thermometer was −59°·7 C. The minimum reading of the up trace was −69°·2 C. at 13·2 kilometres. In the British Isles twenty-eight ascents were made during the above period, twelve of which were on account of the Meteorological Office. The preliminary results of the British series were communicated to the Royal Meteorological Society by Mr. C. J. P. Cave on December 16. The average height reached was 16·4 kilometres, the highest being 23 kilometres, at Pyrton Hill, Oxfordshire. The records of all the balloons recovered, except one, showed the existence of the isothermal layer.

PROF. LARMOR pointed out several years ago in his "Æther and Matter" that the fundamental facts of optics and electrodynamics, those of aberration in particular, require us to assume that the æther does not partake to any sensible extent in the motion of matter through it. On this hypothesis there should, however, be certain modifications in the optical or electrical actions of bodies on each other according to the direction in which the æther is sweeping past them. Such effects have been sought for and not found, and the negative results led Profs. Lorentz and Fitzgerald to suggest as explanation that the bodies themselves undergo changes of shape when they move through the æther which accurately compensate these effects. More recently Prof. Einstein has shown that the "principle of relativity," according to which only relative motions of bodies with respect to each other can produce observable effects, leads to the same law of change of shape, and Prof. H. A. Bumstead, in an interesting article in the November number of the *American Journal of Science*, is disposed to accord it a position analogous to that of the second law of thermodynamics. He applies it in succession to the torsion pendulum, the gravitation pendulum, and to several problems of gravitation, and shows that it leads to a slight modification of the law of gravitation and to consequences which ought to be capable of detection astronomically.

As a supplement to *Rivista Marittima* (Rome) for November are published two papers, by Prof. Guido Cora, on geography and oceanography during the nineteenth century. In the second paper Prof. Cora gives a short, but comprehensive, review of the chief problems of oceanography from its foundation to the present time. The papers should be valuable as guides to work accomplished in geography and oceanography during last century.

MR. C. BAKER, of High Holborn, London, has forwarded a copy of the 1909 issue of section iv. of his catalogue. The catalogue is divided into four parts, dealing respectively with aids to vision, prismatic and other optical appliances, projection apparatus, and meteorological and allied instruments. We have also received the current issue of Mr. Baker's classified quarterly list of second-hand instruments which he has on sale or hire.

OUR ASTRONOMICAL COLUMN.

SEARCH FOR AN ULTRA-NEPTUNIAN PLANET.—Following the recent interesting discussion by Prof. Forbes at the Royal Astronomical Society, of the probable existence of a planet beyond the orbit of Neptune, there is an interesting note by Prof. E. C. Pickering in No. 4292 of the *Astronomische Nachrichten* (p. 323, December 18).

In this note Prof. Pickering mentions that as the result of an investigation, an abstract of which was read at the American Academy of Arts and Sciences on November 11, Prof. W. H. Pickering finds evidence of the existence of an ultra-Neptunian planet, which at the epoch 1909·0 will be located approximately in R.A. 7h. 47m., dec. +21°. Photographs of this region have already been taken with the 24-inch Bruce telescope at Arequipa, and the Rev. J. H. Metcalf is also employing his 12-inch doublet for the same research.

As this region is now easily accessible, Prof. Pickering asks that other astronomers, having the use of suitable instruments, should join in the search. Should the proposal be accepted by any number of workers, it is proposed that a systematic study of this portion of the ecliptic might be organised.

FURTHER OBSERVATIONS OF MOREHOUSE'S COMET, 1908*c*.—In No. 24 of the *Comptes rendus* (p. 1263, December 14) M. J. Guillaume gives some further interesting details concerning the remarkable changes which took place in the form of comet 1908*c* as observed at the Lyons Observatory.

On October 24 the nucleus was seen to be elongated and to have a granular appearance with a small stellar condensation, of about the thirteenth magnitude, towards the eastern extremity of the head. The light of a star, of the tenth or eleventh magnitude, appeared to be augmented as the head of the comet passed before it until it reached the eastern edge, when sudden diminutions of brightness occurred at intervals of several seconds.

Remarkable oscillations of the brightness of various parts of the coma were also observed, and on November 17, when the field of the telescope was artificially illuminated, the comet disappeared with a star of the ninth magnitude.

The same number of the *Comptes rendus* also contains the results of observations of the comet's position, made at the Toulouse Observatory between October 2 and 13.

THE FIGURE OF THE SUN.—In No. 26 of the Contributions from the Observatory of Columbia University, New York, Prof. Charles Lane Poor brings together in a general discussion the results hitherto obtained from investigations dealing with the figure of the sun, and its possible variations.

Some of the earlier results were directly contradictory in their statements as to whether the equatorial or the polar diameter was the longer, whilst later results indicate that although there may be a fluctuating difference, its magnitude is insufficient to show definitely.

Prof. Poor, summing up the general results of the present investigation of meridian, heliometer, and photographic measures, concludes that the exact shape of the sun is not known, but the generally accepted idea that it is a sphere is at least open to question. All the measures show a departure from the spherical form, but the difference between the various radii probably does not exceed 0″·25.